

1       What is claimed is:

2       1. A door condition sensor for a chamber having an entry  
3       door and a door frame therefor comprising:  
4       a. a sensor housing adaptable for mounting on an inside  
5       surface of the door;  
6       b. frame engageable means for abutting the door frame when  
7       the door is completely closed, the frame engageable means  
8       being slideably mounted in the sensor housing and confined to  
9       linear displacement therein;  
10      c. rotatable driver means rotatably mounted in the sensor  
11      housing at a fixed axial location therein, the rotatable  
12      driver means being rotatably driven by the frame engageable  
13      means, the rotatable driver means for transforming linear  
14      displacement of the frame engageable means into corresponding  
15      rotational orientation of the rotatable driver means;  
16      d. analog signal generator means mounted in the sensor  
17      housing having a rotatable part driven by the rotatable driver  
18      means and having an axis coinciding with the fixed axial  
19      location in the sensor housing, the analog signal generator  
20      means for producing analog signals corresponding to the  
21      rotational orientation of the rotatable part of the analog  
22      signal generator means; and  
23      e. biasing means for extending a part of the frame  
24      engageable means away from the sensor housing and for

1        maintaining the frame engageable means against the door frame  
2        when the door is completely closed.

3        2.    The door condition sensor of claim 1, further comprising  
4        fastening means for fastening the sensor housing to the  
5        inside surface of the door.

6        3.    The door condition sensor of claim 1, wherein the analog  
7        signal generator means includes a potentiometer.

8        4.    The door condition sensor of claim 1, wherein the frame  
9        engageable means has a ramp-shaped leading surface for  
10        striking and abutting a jamb of the door frame as the  
11        door is closed, so that frame engageable means is easily  
12        displaced into the sensor housing.

13        5.    The door condition sensor of claim 1,  
14                wherein the rotatable driver means is a segmented  
15                gear having outwardly extending gear teeth, and  
16                wherein the frame engageable means has a linear set  
17                of complementary gear teeth inwardly extending for  
18                engaging the outwardly extending gear teeth of the  
19                rotatable driver means.

20        6.    The door condition sensor of claim 1, wherein the biasing  
21        means is coil extension spring.

1       7. The door condition sensor of claim 6, wherein the sensor  
2       housing has a channel for holding a portion of the coil  
3       extension spring when the door is completely open, and  
4       for holding approximately the entire coil extension  
5       spring when the door is completely closed.

6       8. The door condition sensor of claim 7, wherein the frame  
7       engageable means has a prong for axial insertion into one  
8       end of the coil extension spring for maintaining the coil  
9       extension spring in a straight line at all extensions of  
10      the frame engageable means from the sensor housing.

11      9. The door condition sensor of claim 1, wherein the biasing  
12      means is also for maintaining the frame engageable means  
13      against a part of the door frame when the door is nearly  
14      closed.

15      10. The door condition sensor of claim 1, further comprising  
16       a housing cover removably attached to the sensor housing  
17       for confining a portion of the frame engageable means  
18       within the sensor housing and the housing cover, and for  
19       maintaining a slidable linear relationship of the frame  
20       engageable means relative to the sensor housing.

- 1 11. The door condition sensor of claim 10, wherein the
- 2 housing cover includes means for preventing the frame
- 3 engageable means from being completely removed from the
- 4 sensor housing.
- 5 12. The door condition sensor of claim 10,
- 6 wherein the frame engageable means has a linear stop
- 7 slot, and
- 8 wherein the housing cover has an internal stop
- 9 positioned within the linear stop slot, the linear stop
- 10 slot and internal stop for confining the linear movement
- 11 of the frame engageable means between approximately a
- 12 closed-door position and an opened-door position.
- 13 13. The door condition sensor of claim 10, further comprising
- 14 fastening means for securing the housing cover to the
- 15 sensor housing.
- 16 14. The door condition sensor of claim 1, further comprising
- 17 conversion means for converting analog signals from the
- 18 analog signal generator means to corresponding digital
- 19 signals.
- 20 15. The door condition sensor of claim 14, wherein the
- 21 corresponding digital signals are proportional to linear
- 22 displacement of the frame engageable means.

1       16. The door condition sensor of claim 14, further comprising  
2           means for receiving the digital signal from the  
3           conversion means, and for converting the digital signal  
4           to a distance parameter indicative of present extension  
5           of frame engageable means relative to the sensor housing..

6       17. The door condition sensor of claim 16, further comprising  
7           means electrically linked to the door condition sensor,  
8           for entering a preset set point corresponding to a  
9           distance that the frame engageable means is extended when  
10           the door is completely closed.

11      18. The door condition sensor of claim 17, further comprising  
12           means for entering a tolerance for an acceptable  
13           deviation from the preset set point thereby defining a  
14           preset set point range.

15      19. The door condition sensor of claim 18, further comprising  
16           a tampering alarm, means for identifying a door closing  
17           that is not normal and thereby may indicate a tampering  
18           or a compromising of security of the chamber, and means  
19           for activating the tampering alarm in event of said  
20           tampering or comprising.

1       20. The door condition sensor of claim 18, further comprising  
2           a tampering alarm, means for identifying non-normal  
3           displacements of the frame engageable means that are not  
4           within the preset set point range, and means for  
5           activating the tampering alarm in event of the non-normal  
6           displacements.

7       21. The door condition sensor of claim 20, further comprising  
8           means for time stamping each occurrence of an activation  
9           of the tampering alarm.

10      22. The door condition sensor of claim 21, further comprising  
11           means for producing a retrievable chronological record of  
12           each time stamping.

13      23. The door condition sensor of claim 14, further comprising  
14           a time alarm, and means for entering an allowed open  
15           period for the door to be open and for activating the  
16           time alarm when lapsed time that the door remains open  
17           exceeds the allowed open period.

18      24. The door condition sensor of claim 23, further comprising  
19           means for time stamping each occurrence of an activation  
20           of the time alarm.

1       25. The door condition sensor of claim 24, further comprising  
2           means for producing a retrievable chronological record of  
3           each time stamping.

4       26. A door condition sensor for a chamber having an entry  
5           door and a door frame therefor comprising:  
6           a. a sensor housing adaptable for mounting on an inside  
7           surface of the door;  
8           b. frame engageable means for abutting the door frame when  
9           the door is completely closed, the frame engageable means  
10          being slideably mounted in the sensor housing and confined to  
11          linear displacement therein;  
12          c. rotatable driver means rotatably mounted in the sensor  
13          housing at a fixed axial location therein, the rotatable  
14          driver means being rotatably driven by the frame engageable  
15          means, the rotatable driver means for transforming linear  
16          displacement of the frame engageable means into corresponding  
17          rotational orientation of the rotatable driver means;  
18          d. analog signal generator means mounted in the sensor  
19          housing having potentiometer with a rotatable part driven by  
20          the rotatable driver means and having an axis coinciding with  
21          the fixed axial location in the sensor housing, the analog  
22          signal generator means for producing analog signals  
23          corresponding to the rotational orientation of the rotatable  
24          part of the analog signal generator means;

1       e.    a spring for extending a part of the frame engageable  
2       means away from the sensor housing and for maintaining the  
3       frame engageable means against the door frame when the door is  
4       completely closed; and  
5       f.    a housing cover removably attached to the sensor housing  
6       for confining a portion of the frame engageable means within  
7       the sensor housing and the housing cover, and for maintaining  
8       a slidable linear relationship of the frame engageable means  
9       relative to the sensor housing.

10      27.   The door condition sensor of claim 16, further comprising  
11       conversion means for converting analog signals from the  
12       analog signal generator means to corresponding digital  
13       signals that are proportional to linear displacement of  
14       the frame engageable means.